

IN THE CLAIMS

The current listing of claims is presented below.

1. (currently amended) A method of compensating for losses in a tunable optical filter that includes a waveguide formed from tunable material and discrete sections of an amplifying material disposed in a parallel relationship lateral to the tunable material waveguide, the tuning and amplifying materials having different compositions, the method comprising:
passing light along the tunable material waveguide; and
injecting charge carriers through the tunable material and the amplifying material lateral to the tunable material waveguide at the same time, wherein a distance between at least some parts of the tunable material and the amplifying material is greater than a charge carrier diffusion length, so as to provide gain to the light as it passes along the tunable material waveguide and so as to change the refractive index of the tunable material to a desired value.
2. (cancelled)
3. (original) A method as recited in claim 1, further comprising placing the tuning material at an average distance from the amplifying material that is greater than the diffusion length of the charge carriers.
4. (original) A method as recited in claim 1, further comprising disposing repeated lengths of amplifying material along a direction parallel to the waveguide.
5. (original) A method as recited in claim 1, wherein the filter includes a grating structure formed of sections of grating material regularly spaced along the waveguide, and further comprising disposing the amplifying material as sections beside respective sections of grating material, the sections of amplifying material having substantially a same extent as the respective sections of the grating material.

6. (original) A method as recited in claim 1, wherein the amplifying material has a photoluminescence wavelength of about 1.55 μm .
7. (original) A method as recited in claim 1, wherein the filter is a frequency-selective reflector having a peak reflectivity at approximately about $\lambda = 1.55 \mu\text{m}$.
8. (original) A method as recited in claim 6, wherein the amplifying material is $\text{In}_{(1-x)}\text{Ga}_x\text{As}_y\text{P}_{(1-y)}$.
9. (previously presented) A tunable optical filter, comprising
a tunable waveguide formed from a tuning material; and
an amplifying material having a composition different from the composition of the tuning material, the amplifying material disposed in multiple discrete sections in a parallel relationship lateral to the tunable waveguide so as to be capable of amplifying light at the same time as the light propagates along the tunable waveguide, portions of the tuning material being separated from the discrete sections of the amplifying material by a distance greater than a charge carrier diffusion length.
10. (cancelled)
11. (original) A filter as recited in claim 9, wherein the tuning material is disposed at an average distance from the amplifying material that is greater than the diffusion length of the charge carriers.
12. (original) A filter as recited in claim 9, wherein the amplifying material is disposed proximate the tunable waveguide as repeated lengths of amplifying material parallel to the tunable waveguide.
13. (original) A filter as recited in claim 9, further comprising a grating structure formed of sections of grating material regularly spaced along the tunable waveguide, the amplifying material being disposed as sections beside respective sections of grating material, the

sections of amplifying material having substantially a same extent as the respective sections of the grating material.

14. (original) A filter as recited in claim 9, wherein the amplifying material has a photoluminescence wavelength of about $1.55\text{ }\mu\text{m}$.

15. (original) A filter as recited in claim 9, wherein the filter is a frequency-selective reflector having a peak reflectivity at approximately about $\lambda = 1.55\text{ }\mu\text{m}$.

16. (original) A filter as recited in claim 15, wherein the amplifying material is $\text{In}_{(1-x)}\text{Ga}_x\text{As}_y\text{P}_{(1-y)}$.

17. (original) A filter as recited in claim 9, further comprising a second waveguide proximate the tunable waveguide so that light couples between the tunable and second waveguides.

18. (original) A filter as recited in claim 17, further comprising a grating structure disposed proximate the tunable waveguide to frequency select the light coupled between the tunable waveguide and the second waveguide.

19. (original) A filter as recited in claim 9, wherein the tuning material has a bandgap energy higher than the photon energy of the light propagating along tunable waveguide.

20. (original) A filter as recited in claim 19, wherein the amplifying material has a band gap energy approximately the same as the photon energy of the light propagating along the tunable waveguide.

21. (new) A tunable optical filter, comprising
a first waveguide formed from a first waveguide material;
a second waveguide disposed parallel to and proximate the first waveguide so as to form a directional coupler filter; and

an amplifying material having a composition different from the composition of the first waveguide material, the amplifying material disposed in a parallel relationship proximate the first waveguide so as to be capable of amplifying light at the same time as the light propagates along the first waveguide of the directional coupler filter.

22. (new) A filter as recited in claim 21, wherein the waveguide material is disposed at an average distance from the amplifying material that is greater than a charge carrier diffusion length.

23. (new) A filter as recited in claim 21, wherein the amplifying material is disposed proximate the first waveguide as repeated lengths of amplifying material parallel to the first waveguide.

24. (new) A filter as recited in claim 21, further comprising a grating structure formed of sections of grating material regularly spaced in a direction along the first waveguide to facilitate optical coupling between the first and second waveguides, the amplifying material being disposed as sections beside respective sections of the grating material.

25. (new) A tunable optical filter, comprising

a first waveguide formed from a first tunable waveguide material, the first waveguide having an input to receive input light;

a distributed Bragg grating disposed proximate the first waveguide so as to form a distributed Bragg reflector (DBR) filter that reflects light propagating along the first waveguide at a selected wavelength, the reflected light passing out of first waveguide at the input;

an electrode disposed proximate the first waveguide, the selected wavelength being variable according to an amount of current passing through the first waveguide from the electrode; and

an amplifying material having a composition different from the composition of the first tunable waveguide material, the amplifying material disposed in a parallel relationship proximate the first waveguide so as to be capable of amplifying light at the

same time as the light propagates along the first waveguide when a current passes from the electrode through the amplifying material.

26. (new) A filter as recited in claim 21, wherein the waveguide material is disposed at an average distance from the amplifying material that is greater than a charge carrier diffusion length.

27. (new) A filter as recited in claim 21, wherein the amplifying material is disposed proximate the first waveguide as repeated lengths of amplifying material parallel to the first waveguide.

28. (new) A filter as recited in claim 21, wherein the distributed Bragg grating comprises sections of grating material, the amplifying material being disposed as sections beside respective sections of the grating material.